

CLAIMS

1. A method of configuring a medical balloon catheter assembly comprising the steps of:

5 providing a medical balloon catheter assembly including a medical balloon; at least partially inflating the medical balloon; forming a plurality of primary lobes in the balloon, the primary lobes spaced about the periphery of the balloon and extending from a central portion of the balloon; manipulating at least one primary lobe to form at least two secondary lobes therefrom; and

10 deflating the balloon.

2. The method of claim 1 wherein all of the primary lobes are manipulated so as to form at least two adjacent secondary lobes from each primary lobe.

3. The method of claim 2 wherein a radially inward force is applied to each primary lobe during the manipulating step to form a pair of secondary lobes from each primary lobe.

15 4. The method of claim 3 further comprising the step of applying a vacuum to the balloon during the deflating step.

5. The method of claim 4 further comprising the step of providing a plurality of first impinging members spaced about the periphery of the balloon and wherein the primary lobes are formed by directing the plurality of first impinging members radially inward to apply a radially inward force to the balloon at a plurality of locations.

20 6. The method of claim 5 further comprising the step of providing a plurality of second impinging members spaced about the periphery of the balloon and wherein the secondary lobes are formed by directing the plurality of second impinging members

25 radially inward to the primary lobes to apply a radially inward force to the primary lobes.

7. The method of claim 6 further comprising the step of wrapping the deflated secondary lobes about the central portion of the balloon.

30 8. The method of claim 7 where secondary lobes, which are formed from the same primary lobe, are wrapped in opposite directions from one another about the central portion of the balloon.

9. The method of claim 8 wherein the first impinging members continue to contact the balloon while the second impinging members are directed radially inward to the primary lobes to form the secondary lobes.

10. The method of claim 9 wherein the first impinging members are removed from contact with the balloon prior to wrapping the secondary lobes.

11. The method of claim 10 wherein, the wrapping step includes the steps of:  
5 wrapping every other secondary lobe in a first direction about the central portion of the balloon and subsequently wrapping any unwrapped lobes in a second direction opposite the first direction about the central portion of the balloon.

12. The method of claim 11 wherein each pair of secondary lobes includes a first secondary lobe which overlaps one secondary lobe from an adjacent pair of secondary lobes and a second secondary lobe which is overlapped by one secondary lobe from 10 another adjacent pair of secondary lobes.

13. The method of claim 11 wherein a plurality of third impinging members are provided and every other secondary lobe is wrapped by applying thereto a force directed toward the central portion of the balloon with a third impinging member.

14. The method of claim 13 wherein a plurality fourth impinging members are 15 provided and every remaining unwrapped lobe is subsequently wrapped by applying thereto a force directed toward the central portion of the balloon with a fourth impinging member.

15. The method of claim 1 wherein at least one of the primary lobes is manipulated to form at least three secondary lobes.

20. The method of claim 15 wherein each primary lobe is manipulated to form at least three secondary lobes therefrom.

25. The method of claim 16 wherein the primary lobes are formed by impinging one or more first impinging members inward against the balloon and the secondary lobes are formed by impinging two or more second impinging members inward against each primary lobe.

18. The method of claim 17 wherein a first secondary lobe, a second secondary lobe and a third secondary lobe are formed from each primary lobe, the first secondary lobe larger than the second secondary lobe and the third secondary lobe.

19. The method of claim 18 further wherein during the deflating step, a vacuum is 30 applied to the balloon to form a plurality of antenna-shaped structures extending from a central portion of the balloon, each antenna-shaped structure including a center antenna portion extending outward from the balloon and a plurality of wings extending from a first side of the center antenna portion and a plurality of wings extending from a second side of the center antenna portion opposite the first side.

20. The method of claim 19 wherein the antenna-shaped structure includes two wings extending from the first side of the central portion of the balloon and two wings extending from the second side of the central portion of the balloon.

21. A medical balloon having a central portion and a plurality of wings disposed thereabout, the plurality of wings including at least one first wing wrapped in a first direction about the central portion of the balloon and at least one second wing wrapped in a second direction opposite the first direction about the central portion of the balloon.

5 22. The medical balloon of claim 21 comprising a plurality of first wings wrapped in the first direction about the central portion of the balloon and a plurality of second wings wrapped in the second direction about the central portion of the balloon.

10 23. The balloon of claim 22 wherein the first and second wings alternate with one another about the central portion of the balloon.

15 24. The balloon of claim 23 comprising a plurality of T-shaped structures extending from the central portion of the balloon, each T-shaped structure including one first wing and one second wing.

25. The balloon of claim 23 wherein each secondary wing is in an overlapping relationship with one first wing.

26. The balloon of claim 21 comprising a plurality of pairs of first and second wings, each pair of first and second wings comprising first wing and the second wing nearest thereto, the pairs spaced about the central portion of the balloon.

20 27. In combination, the medical balloon of claim 21 and a stent, the stent disposed about the medical balloon.

28. The combination of claim 27 wherein the stent includes a coating comprising a therapeutic agent.

25 29. A medical balloon having a central portion and a plurality of structures extending from the central portion, the structures each comprising a first wing extending therefrom in a first direction and a second wing extending therefrom in a second direction opposite the first direction.

30. The medical balloon of claim 29 wherein the structures are T-shaped or V-shaped.

31. In combination, the medical balloon of claim 30 and a stent, the stent disposed about the medical balloon.

32. The combination of claim 31 wherein the stent includes a coating comprising a therapeutic agent.

33. A method of forming balloon wings in a medical balloon comprising the steps of:

providing a medical balloon with one or more primary lobes therein;

forming a plurality of secondary lobes from each primary lobe by applying an inward force to each of the primary lobes; and

deflating the balloon.

34. The method of claim 33 wherein the inward force is applied to the primary lobes via a plurality of impinging members.

35. The method of claim 34 wherein the impinging members are removed following the forming step by moving the impinging members in an axial direction.

36. In combination, a medical balloon and an expandable prosthetic device disposed about the medical balloon, the medical balloon comprising a plurality of wings extending from a main balloon body, the wings wrapped about the main balloon body such that upon inflation of the medical balloon there is substantially no relative rotational movement between the prosthetic device and the balloon.

37. An apparatus for configuring a medical balloon of a medical balloon catheter assembly, the apparatus comprising a catheter holder, a plurality of movable blades disposed about a common central point and one or more blade moving devices in mechanical communication with the movable blades, the one or more blade moving devices capable of moving the movable blades inward toward the common central point.

38. The apparatus of claim 37 comprising a single blade moving device.